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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,490	02/11/2004	Yu-Fang Tsai	250123-1030	3223
24504	7590	09/22/2005		
THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP 100 GALLERIA PARKWAY, NW STE 1750 ATLANTA, GA 30339-5948			EXAMINER LUU, CHUONG A	
			ART UNIT	PAPER NUMBER
			2818	

DATE MAILED: 09/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/776,490

Applicant(s)

TSAI ET AL.

Examiner

Chuong A. Luu

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_.

**DETAILED ACTION**

**PRIOR ART REJECTIONS**

**Statutory Basis**

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**The Rejections**

Claims 1-8 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Fan et al. (U.S. 6,781,242 B1).

Fan discloses an integrated circuit package with

(1) providing a substrate (22) having an opening and a bottom surface formed with a plurality of bond pads (24);

disposing a metal slice (26) on the bottom surface of the substrate to cover the opening and the bond pads on the bottom surface of the substrate (22);

disposing a die (28) on the metal slice (26) inside the opening or above a top surface of the substrate (22) outside the opening;

forming a plurality of bond wires (30) between the top surface of the die (28) and the top surface of the substrate (22) to electrically connect the die to the substrate (22);

forming an encapsulating mold compound (32) to cover the die (28), the bond wires (30), and a part of the top surface of the substrate (22);

removing a part of the metal slice (26) to form a metal heat slug thermally connected to the die (28) and to expose the bond pads (24) (see Figures 3A-3F);

**(2)** further comprising a step of forming a plurality of solder balls (34) flush with each other on the bond pads (24) after the step of removing the part of the metal slice (26) (see Figure 3F);

**(3)** wherein a thickness of the metal heat slug is smaller than a height of each of the solder balls (see Figure 3F);

**(4)** wherein the step of disposing the metal slice on the bottom surface of the substrate comprises the step of using an adhesive agent to dispose the metal slice on the bottom surface of the substrate (see column 3, lines 37-60. Figures 3A-3F);

**(5)** wherein the step of disposing the die on the metal slice inside the opening comprises the steps of: using an adhesive agent to dispose the die, which has a bottom area smaller than a dimension of the opening, on the metal slice inside the opening, and filling another adhesive agent into a gap between the die and a sidewall of the opening (see column 3, lines 37-60. Figures 3A-3F);

**(6)** wherein the step of disposing the die on the metal slice inside the opening comprises the steps of: using an adhesive agent to dispose the die, which has a bottom area equal to a dimension of the opening, on the metal slice inside the opening (see column 3, lines 37-60. Figures 3A-3F);

(7) wherein the step of disposing the die above the top surface of the substrate outside the opening comprises the steps of: using an adhesive agent to dispose the die, which has a bottom area greater than a dimension of the opening, on the top surface of the substrate outside the opening; and filling the adhesive agent in the opening between the die and the metal slice (see column 3, lines 37-60. Figures 3A-3F);

(8) wherein the die is thermally connected to the metal heat slug by the adhesive agent (see column 3, lines 37-60. Figures 3A-3F);

(11) wherein the step of removing the pad of the metal slice comprises the step of: etching the metal slice to form a metal heat slug that is thermally connected to the die (see column 3, lines 37-60. Figures 3A-3F).

## **PRIOR ART REJECTIONS**

### **Statutory Basis**

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

### **The Rejections**

Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fan et al. (U.S. 6,781,242 B1) in view of Shin et al. (U.S. 6,762,078 B2).

Fan teaches everything above except for the metal heat slug is made of copper. However, Shin discloses a semiconductor package with **(9)** wherein the metal slice is made of copper (see column 9, lines 38-45); **(10)** wherein the metal heat slug is made of copper (see column 9, lines 38-45). It would have been obvious to one having ordinary skill in the art at the time the invention was made to select copper as specific material for the metal slug, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chuong A. Luu whose telephone number is (571) 272-1902. The examiner can normally be reached on M-F (6:15-2:45).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2818

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Chuong Anh Luu  
Patent Examiner  
September 13, 2005